REMARKS

The Office Action of February 20, 2003 has been received and its contents carefully reconsidered.

The Examiner has attached to the Office Action a copy of the Form PTO 1449 that was filed with the Information Disclosure Statement of May 15, 2001. The Examiner has initialed and dated each of the references listed on this Form to indicate that he has considered and made them of record, except that the Examiner has not initialed and dated the Ceramics Engineering Handbook reference. Applicants request the Examiner to initial and date the Ceramics Engineering Handbook reference to indicate that he has considered it and made it of record.

Applicants note that claims 5-8 have been allowed.

The Examiner has objected to the specification because the heading "Brief Description of the Invention", which appears at page 7 of the specification, is an incorrect heading because it appears at a place where the drawings are described and not where the invention is described. The Examiner suggests that the heading be changed to --Brief Description of the Drawings--.

In response, applicants have amended the specification in accordance with the Examiner's suggestion.

Claims 1, 2 and 10 have been rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent 4,960,801 to Iglesia et al.

Applicants submit that Iglesia et al do not disclose or render obvious the presently claimed invention and, accordingly, request withdrawal of this rejection.

The present invention is directed to particulate titanium oxide comprising a mixed crystal titanium oxide containing rutile crystal produced by a vapor phase process, wherein the titanium oxide has a property represented by the following general formula (1)

$$R \geqq 1{,}300 \times B^{-0.95} \qquad (1)$$

wherein R represents a rutile content (%) measured by an X-ray diffraction method and B represents a BET specific surface area (m^2/g), which ranges from about 15 to about 200 m^2/g.

Claim 3, which depended from claim 1, was not included in this rejection. Applicants have amended claim 3 by placing it in independent form and have cancelled claim 1. Claim 3 recites that the particulate titanium oxide has a 90% cumulative weight particle size distribution diameter D90 measured by a laser diffraction-type particle size distribution measuring method of about 2.5 μm or less.

A characteristic feature of the present invention resides in that the mixed crystal titanium oxide containing rutile crystal is produced by a vapor phase process, so that the aggregation of the crystal titanium oxide is not significant or the particle size of the aggregated particles is small in comparison with that produced by a liquid phase process, while the rutile content of the mixed crystal titanium oxide is higher than that which was attained in the conventional vapor phase processes.

Most of the references cited by the Examiner relate to the liquid phase process, in which it is well known that the rutile content of the mixed crystal titanium oxide can be high and the primary crystal size can be small, but the aggregation of the particles is significant so that the particle size of the aggregated particles does not satisfy formula (1) of the present claims or the requirement of claim 3 that "the titanium oxide has a 90% cumulative weight particle size

distribution diameter D90 measured by a laser diffraction-type particle size distribution measuring method of about 2.5 μm or less".

In the Office Action, it appears that the Examiner did not appreciate the fact that the mixed crystal titanium oxide containing rutile crystal of the present invention is produced by a vapor phase process.

Iglesia et al do not describe the process for producing a titanium oxide at all and, therefore, do not teach or suggest the present invention as defined in claim 3 which recites particulate titanium dioxide produced by a vapor phase process, and the novel titanium oxide produced by the vapor phase process.

In view of the above, applicants submit that Iglesia et al do not defeat the patentability of claim 3 and the claims dependent thereon, and, therefore, request withdrawal of this rejection.

Claim 1-3 and 10 have been rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent 6,001,326 to Kim et al.

Applicants submit that Kim et al do not disclose or suggest the presently claimed invention and, accordingly request withdrawal of this rejection.

In the Office Action, the Examiner refers to both Examples 1 and 2 of Kim et al.

In describing Example 2, the Examiner refers to column 8, lines 39-41. The disclosure at column 8, lines 39-41, however, is present in Example 1, and not in Example 2.

In any event, both Examples 1 and 2 of Kim et al disclose titanium dioxide produced by a liquid phase process, not a vapor phase process. As can be seen from the Kim et al Abstract, the description at column 3, line 38 to column 4, line 15, and Examples 1 and 2 of the Kim et al patent, the Kim et al invention is based on a liquid phase process.

Thus, Kim et al disclose a liquid phase process of producing a titanium oxide and, therefore, do not teach or suggest the present invention as defined in claim 3, which recites a particulate titanium dioxide produced by a vapor phase process and the novel titanium oxide produced by the particular vapor phase process.

In view of the above, applicants submit that Kim et al do not defeat the patentability of the presently claimed invention and, accordingly, request withdrawal of this rejection.

Claim 1-3 and 10 have been rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent Application Publication No. 2001/0036437 Al to Gutsch et al.

Applicants submit that Gutsch et al '437 do not disclose or render obvious the presently claimed invention and, accordingly request withdrawal of this rejection.

As discussed above, claim 1 has been cancelled and claim 3 has been placed in independent form. With respect to claim 3, the Examiner refers to Table 2 of Gutsch et al for a disclosure of a TEM size of 0.2 to 2 microns. Table 2 of Gutsch et al, however, appears in Example 2, which relates to aluminum oxide and not titanium oxide. Therefore, applicants submit that it is clear that the disclosure in Table 2 of Gutsch et al does not anticipate claim 3.

In addition, Gutsch et al do not disclose the particular vapor phase process of the present invention and, therefore, do not disclose the novel titanium oxide obtainable by the particular vapor phase process.

Further, the Examiner refers to Table 1, claim 1, and the Abstract of Gutsch et al '437 as disclosing examples of titanium dioxide having a BET surface area of 1-600 or 79 m^2/g.

Table 1 of Gutsch et al '437 discloses a BET of 79 m^2/g, but Table 1 relates to monoclinic ZrO_2, and not to titanium dioxide. Thus, the disclosure in Table 1 does not satisfy the recitations of the present claims.

The Abstract and claim 1 of Gutsch et al disclose a BET surface area of between 1 and 600 m^2/g for oxides and/or mixed oxides, but do not specifically refer to titanium dioxide.

Accordingly, applicants submit that there is no disclosure in Gutsch et al of the recitations of the present claims.

In view of the above, applicants submit that Gutsch et al do not defeat the patentability of the presently claimed invention and, accordingly, request withdrawal of this rejection.

Claim 9 and 11 have been rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Iglesia et al '801.

Claims 9 and 11 depend from claim 5, which has been allowed, and which recites a particular vapor phase process for producing particulate titanium dioxide.

As discussed above, Iglesia et al do not disclose how they produce the titanium dioxide, and the properties of titanium dioxide are dependent on its method of production. Applicants submit that the titanium dioxide in Iglesia et al is different from the titanium dioxide of the present invention.

In view of the above, applicants submit that Iglesia et al do not defeat the patentablility of claims 9 and 11 and, accordingly, request withdrawal of this rejection.

Claims 9 and 11 have been rejected under 35 U.S.C. § 102(e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Kim et al '326.

As discussed above, claims 9 and 11 depend from claim 5, which recites a particular vapor phase process for producing particulate titanium dioxide.

As discussed above, Kim et al relate to a liquid phase process and therefore, the titanium dioxide produced by Kim et al is different from the titanium dioxide of the present invention.

In view of the above, applicants submit that Kim et al do not defeat the patentability of claims 9 and 11 and, accordingly, request withdrawal of this rejection.

Claims 9 and 11 have been rejected under 35 U.S.C. § 102(e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Gutsch et al '437.

The Examiner again relies on the fact that claims 9 and 11 are product-by-process claims, and relies on the portions of Gutsch et al that he previously identified.

As discussed above, claims 9 and 11 depend from claim 5 which has been allowed. Gutsch et al do not disclose the particular vapor phase process set forth in claims 9 and 11 and, accordingly, do not disclose the titanium dioxide of claim 9 and 11.

In view of the above, applicants request withdrawal of this rejection.

Claim 4 has been rejected under 35 U.S.C. § 103(a) as obvious over Iglesia et al.

The Examiner recognizes that Iglesia et al fail to disclose a Rosin-Rammler constant of 1.5 or more, but relies on the disclosure of Satoh et al for a Rosin-Rammler distribution of n of 6.0 or greater, as disclosed in the Satoh et al Abstract.

The Examiner argues that it would have been obvious to employ the distribution of Satoh et al with the titanium dioxide of Iglesia et al because Satoh et al disclose that their distribution could be used to obtain a titanium compound catalyst, and Iglesia et al disclose distributions of

crystallite sizes for chemisorption at column 5, lines 49-50 and column 6, lines 1-15 where Iglesia et al refer to dispersion and fractional dispersions.

Applicants first note that the Examiner relies on the Satoh et al patent, but does not include the Satoh et al patent in the statement of the rejection. This is improper. See the MPEP at 706.02 (j).

In any event, claim 4 depends from claim 3. Accordingly, applicants submit that claim 4 is patentable over Iglesia et al for the same reasons as discussed above in connection with claim 3.

Further, Satoh et al disclose a liquid phase process of producing a titanium oxide and, therefore, do not teach or suggest the present invention which discloses a particular vapor phase process and the novel titanium oxide produced by the particular vapor phase process.

In view of the above, applicants submit that claim is patentable over Iglesia et al and Satoh and, accordingly, request withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

Sheldon I. Landsman

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE

23373
PATENT TRADEMARK OFFICE

Sheldon I. Landsman
Registration No. 25,430

Date: May 27, 2003

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Page 7, fifth paragraph

BRIEF DESCRIPTION OF THE DRAWINGS [INVENTION]

Fig. 1 is a diagram showing the range of property of the ultrafine particulate, rutile-containing titanium oxide of the present invention in respect of rutile content vs. BET specific surface area of the ultrafine particulate titanium oxide.

IN THE CLAIMS:

Claim 1 is canceled.

The claims are amended as follows:

2. (Amended) The particulate titanium oxide as claimed in claim 3 [1], wherein the BET specific surface area represented by B is about 40 to about 200 m^2/g.

3. (Amended) [The particulate] Particulate titanium oxide comprising a mixed crystal titanium oxide containing rutile crystal produced by a vapor phase process, wherein the titanium oxide haas a property represented by the following general formula (1)

$$R \geq 1{,}300 \times B^{-0.95} \qquad (1)$$

wherein R represents a rutile content (%) measured by an X-ray diffraction method and B represents a BET specific surface area (m^2/g), which ranges from about 15 to about 200 m^2/g. [as claimed in claim 1], wherein the titanium oxide has a 90% cumulative weight particle size

distribution diameter D90 measured by a laser diffraction-type particle size distribution measuring method of about 2.5 μm or less.

4. (Amended) The particulate titanium oxide as claimed in claim 3 [1], wherein the titanium oxide has a distribution constant n according to Rosin-Rammler formula of [is] about 1.5 or more.

10. (Amended) A titanium oxide composition comprising particulate titanium oxide as claimed in claim 3 [1].